

figure in Ehrenberg shows a difference from the perfect plant so much greater than in *Micrasterias rotata*, that it looks like a distinct species, and is in fact so considered in the 'American Bacillariæ.'

PLATE VI. fig. 2. *Micrasterias Melitensis*: perfect frond.

XXXII.—On the genus *Xiphophora*, and, in connexion with it, Observations on this question: Do we find in the Fucacæ the two Modes of Propagation which we observe in the Floridææ? By Dr. MONTAGNE*.

Xiphophora, Montgn., nov. gen.

Frons sterilis, ex qua surgit fertilis (seu receptaculum), dichotoma eaque brevior, compressa, flexuosa (en zigzag) apice truncata. Pars maxima frondis in receptaculum planum, elongatum, dichotomum, papulosum, olivaceo-nigrum, apicibus incurvis ensiformibus insigne, abiens. Conceptacula immersa, per totam frondem fertilem sparsa, globosa, poro pertusa, intus nucleum dimorphum foventia; in altero autem observantur sporæ obovatae, luteo-brunneae, limbo hyalino cinctae, e cellulis parietalibus abortae, paraphysibus gracilibus articulatis simplicibus concomitatae; in altero vero fila adsunt ramosa, articulata, articulo extremo gemmam oblongam, granulosa repletam materie, tandem liberam et perisporio, ut sporæ genuinae, vestitam includente. Habitus *Fuci*, at receptaculum *Himanthaliae*. Nomen e $\xi\acute{\iota}\phi\omicron\varsigma$, ensis, et $\phi\acute{\epsilon}\rho\omega$, fero compositum. *Prodr. nov. Phycæar. in itin. ad polum antarct.* p. 12. t. 7. f. 1.

Xiphophora Billardierii, Montgn., l. c.

Fucus gladius, Labill., Pl. Nov. Holl. t. 256.

Obs.—M. Hombron, principal surgeon of the Astrolabe, was the first to find the fructification of this Alga. Previous to this discovery, the plant from its habit had been ranked among the species of the genus *Fucus*, where I would have left it, had it not previously happened that the *Fucus Loreus* was separated on grounds which ought to have the same value in the case of *F. gladius*, Labill. In all the known species of *Fucus*, the receptacle, elliptical or lanceolate, terminates the frond or the branches, from which it is altogether distinct. Here we have, as in *Himanthalia*, a frond almost entirely converted into a receptacle; and in order to complete the resemblance, or at least the analogy, instead of a sort of fungiform body from which the receptacle originates, we find a frond very short, dichotomous, and remark-

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ably distinct from the receptacle by its flexuose divisions abruptly truncated toward the summit. But these are not the only differences by which we cannot fail to distinguish the new genus which I propose, either from *Fucus* or *Himanthalia*; there are others more profound and of a higher importance, since they occur in the fructification. Thus, besides the frond being converted into a receptacle, that is to say, charged with conceptacles in the greater part of its extent, these last present two modifications in the organs which they contain. In the one the normal spores spring regularly from the wall of the conceptacle, and are accompanied with filaments which are simple, very slender and jointed, without any dilatation of the terminal articulation, in a word, true paraphyses; in the others we find, instead of these, filaments also articulated but much branched, although limited to the cavity of the conceptacle, and in the terminal articulation of which the inclosed olivaceous granular matter becomes organized into an oblong body which increases in size, and finally separating from the filament, falls into the cavity of the cell like the true spores. We find it then inclosed like these last in a perispore which is furnished to it by the tube of the filament, and its size comes to be equal to the third part of that of the normal spore.

The form and disposition of these organs reminded me of a number of observations which I have already made in analysing the Algæ of this tribe. It appeared to me that it would be interesting to discover in what respect these two kinds of organs differ, and if they are different, to assign to each the functions intended by nature. I have resolved therefore to submit to a new and scrupulous examination all the species of *Fucus*, and all the genera more nearly allied. It is not without much diffidence in my own resources that I have ventured to enter upon a question surrounded with so many difficulties and scarcely alluded to by any botanist; I cannot, accordingly, pretend to have resolved it. I shall be glad if the result of my researches, for which I claim their indulgence, should happen to awaken and fix on this question the attention of physiologists more favourably situated than I am for ascertaining the facts, if it be possible, by observation and direct experiment, and thus obtaining a solution of the great difficulties which it still offers.

All botanists are aware that plants, even those which we call cellular, have two modes of propagation, the one by seeds or spores, the other by buds, gemmæ or propagines. These two kinds of organs, so evident in the *Hepaticæ*, are met with also in the *Floridæ*, a family still more closely approaching that to which *Xiphophora* belongs. It has been completely established by experiments against which no doubts can be raised, that the sphaerospores (*anthosperms*, Lamx.), or what we name the second fructi-

fication of the *Florideæ*, can, as well as the seeds of the conceptual fructification, reproduce an individual similar to the parent plant. Such being the case, what difficulty can there be then in regarding as representatives of one of these two modes of propagation, the kind of gongylæ filled with a granular matter which terminate the branches of the jointed filaments which we meet with in the conceptacles of all the *Fucaceæ*, and which M. de la Pylaie has named *microphytes*, a name which I shall retain until we have finally determined the kind of functions which they fulfill?

I am well aware that no fact, no direct experiment can be produced in proof of this rather rash opinion, but which nevertheless seems to me worthy of examination. Long previous to our having recognised and verified their power of propagating the plant, we had considered the anthosperms of Lamouroux as one of the means of reproduction in the *Florideæ*,—anthosperms, which, under the name of sphærospores or tetraspores, are regarded at present as the normal fructification, whilst the conceptacular has fallen to the second rank, and is only considered by some phycologists as an anormal and succedaneous mode of propagation. However this may be, either I am much mistaken, or it appears to me that we may recognise these two modes of reproduction in the *Fucaceæ*, first, in the true spores, either fixed to the base of the paraphyses or to the wall of the conceptacle itself; second, in the microphytes of M. de la Pylaie, figured by Lyngbye (*Hydroph. Dan. t. 1. B. figs. 3 and 4*). These microphytes are most assuredly similar or at least analogous to many of the conceptacular fructifications which among the *Florideæ* are produced in the terminal articulation of a branched and jointed filament, which is usually, as in this case, a continuation of those which constitute the frond. Does not this resemblance between analogous organs in two neighbouring and parallel series appear to add some weight to the opinion held by M. Decaisne respecting the secondary importance of the conceptacular fructification? I confess that, previous to having these new ideas respecting their nature, I took for young spores the gongylæ which the microphytes bear. The error was so much more difficult to avoid, since many species appear destitute of true spores. In his general remarks on the *Fucaceæ*, M. Meneghini (*Alge Ital. e Dalmat.*) himself appears to have considered as normal spores the gemmæ which are borne by the branched filaments of the microphytes; in fact, he expresses himself as follows:—"Essi asci sono ramosi-articulati, alcuni sono fertili, portano cioè le spore, ciascuna delle quali è solitaria in uno degli articoli terminali, gli altri," &c.

We now proceed to the observations, which to a certain extent support my ideas respecting the organs in question:

In one species of *Marginaria*, the *M. Urvilliana*, I have found true spores, accompanied by paraphyses almost simple, jointed, and not inflated at the extremity; the other, *M. Boryana*, in more than twenty receptacles thoroughly examined, has only presented microphytes, very much branched, jointed, and having the terminal articulation of the branches dilated into a spore or gemma, if we prefer this last name, which, becoming detached from the filament, falls into the middle of the conceptacle enveloped by the membrane of the tube in the form of a perispore.

In the *Scytothalia Jacquinotii* I have seen normal spores, accompanied by paraphyses almost simple, moniliform, and transparent.

It would appear from my researches, which unfortunately I have not been able to follow out in a sufficient number of individuals, that in *Himanthalia* the two sorts of filaments, in place of occurring on the same receptacle and in different conceptacles, as in the genus *Xiphophora*, are met with on different individuals. On four specimens analysed by me, two had the normal fructification, which we call *basispermal*; the others only presented microphytes, to which we may also apply the name *acrosperms*, to distinguish them from the first, although I freely confess that there exist intermediate forms which will render these denominations somewhat vague. I state what I have seen in the examples of *Himanthalia* in my possession, but I am far from affirming that such is always the case. I would very much recommend the verification of this point to such botanists as may have opportunity of doing so.

The *Fucus vesiculosus*, of which I have only examined three individuals, has invariably shown the basispermal fructification.

In *F. ceranoides* these are absent, or at least I have only seen one sort of filaments; these are microphytes.

Lyngbye figures the two kinds of filaments and of fructification in *F. serratus*; now on more than ten individuals which I have examined (it must be acknowledged in a dried state) I have only met with the microphytes of the preceding species, differing from them only a little in shape.

As certain *Florideæ* present the two modes of propagation united on the same stem but not confounded together, we also find in *Fucus canaliculatus*, inclosed in the same conceptacle, the filaments of the two kinds, that is to say, the basi- and acrospermal fructification.

It is nearly the same with *F. distichus*; in it we observe all the transitions from true spores to what we may consider as gemmæ or propagines.

Lastly, in a great number of examples of *F. nodosus*, L. (*Hali-drys nodosa*, Lyngb.), I have only observed microphytes; and what

is very remarkable, M. de la Pylaie, who has analysed on the spot at Terre Neuve a great number of individuals of this same species, has never, more than myself, met with the other form of fructification. Nevertheless, Lyngbye has represented the basispermal fructification of this species, and Turner (*Hist. Fuc.* t. 98) says even positively that in it he has seen the two sorts of filaments in the same conceptacle, and what is more, he represents them in such a way that one cannot fail to recognise them.

Such are the facts on which I found my opinion respecting the two modes of propagation in the *Fucaceæ*. I shall not conceal their insufficiency, for I freely acknowledge that they want the sanction of experience. Nevertheless, the subject appears to me to merit the attention of naturalists at a time when the Algæ have been made the subjects of so many important researches.

Some time ago M. M. Crouan (*An. Sc. Nat.* xii. p. 250) had spoken of the double fructification of *Himanthalia*, and more recently M. J. Agardh (*Alg. Medit. et Adriat.* p. 45) has agitated this same question, which had occupied my attention long ago, by expressing it under the form of a doubt. For example, he says, "Alter fructificationis forma in filis receptaculorum forsan adest, licet hoc experimentis directis nondum probatum fuerit." The opinion of the celebrated Swedish phycologist, although stated with such reserve, appears to me to give some value to that which I have been attempting to sustain in this short notice. Whatever judgement may be passed on this, I shall persist in believing that there is in this matter something more than has been hitherto recognised, and that it is a subject of research which interests in a high degree the science of Algology.

XXXIII.—*Further Observations on Ctenodus Labillardieri.* By C. MONTAGNE, D.M., in a *Letter to the Rev. M. J. Berkeley, M.A., F.L.S.*

MY DEAR FRIEND,

YOU doubtless recollect that some time since you communicated to one of your Botanical Journals some observations which I had addressed to you in the course of our correspondence upon the fructification of the new genus *Ctenodus*. You will recollect too that I begged you to procure for me if possible a single fruit of the specimen figured in the excellent work of Turner; for I could not persuade myself that so excellent an observer could have seen but one cell where I had seen twenty. It appeared then more than probable that the singular fructification which I have published, and which had also been observed by Mr. Harvey, was not the conceptacular form figured in the 'Historia Fucorum.' A recent com-